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Does the @home team reduce local Emergency Department attendances? The experience of one London service

Abstract

Background: Since 2014, the @home team has been offering patients acute care in their own homes using a multi-disciplinary team with the aim of preventing some Emergency Department (ED) attendances, facilitating early discharges, and preventing acute admissions. By preventing some ED attendances, the @home team aims to contribute to the performance of the two local EDs, both of which are currently failing to meet the ED 4-hour operational target.

Objectives: To determine if the @home team reduces ED attendances locally, and if so, by how much, and whether this impacted on the 4-hour operational target.

Methods: The number of @home referrals that were prevented from attending either St Thomas's or King's College Hospital EDs was audited using a specially developed audit tool and spatial analysis performed, mapping the home locations of patients referred, and using 'nearest neighbour analysis' to determine the number and percentage of @home referrals prevented from attending the two local EDs.

Results: A total of 1084 patients were referred to the @home team in a 3-month period with 755 (72%) referrals accepted. Using Geo-codable data, 387 local ED attendances were prevented (298 from King's College Hospital and 89 from St Thomas's Hospital ED). Over the same time period, King's College Hospital had 71,688 ED attendances and St Thomas's ED had 48,030 attendances.

Conclusions: Although the @home team reduces a small number of ED attendances each month (1 in 300), this number is not high enough to make a significant impact on average performance against the 4-hour target at the local EDs alone.

Keywords:

@home team, hospital at home, Emergency Department, 4-hour wait, performance, overcrowding

Introduction

The Emergency Department (ED) is the gateway through which the majority of patients are admitted into the hospital setting (Fry et al., 2018). Currently there are many challenges for EDs including increasing patient attendances, an ageing population with more complex health needs, and a depleted workforce with a widespread shortage of emergency medical trainees, senior emergency doctors, and nurses at all levels (Hunt 2016, Cowling et al 2014). In the UK, there is a target that 95% of all ED patients should be seen, treated, admitted or discharged within a 4-hour period but this is currently sub-optimal with only 85.1% of UK EDs are achieving this target (Evans et al 2017, NHS England 2017) with 2.5 million patients in England waiting more than 4 hours in 2017 (Murray et al 2017). In an attempt to relieve pressure on EDs and achieve the 4-hour operational targets, many new initiatives have been developed including the introduction of an accredited Emergency Care Practitioner's role by the Royal College of Emergency Medicine and Health Education England, and the introduction of General Practitioners or senior nurses streaming patients at the front door of EDs (Evans 2017, Ham, 2015).

Data suggests that a large proportion of ED presentations could actually be treated or cared for by primary care services or by self-care (Cowling et al 2014). They also found that 47% of ED attendances in England and Wales in 2012-2013 were discharged without needing treatment, or just needing advice. The @home team aims to relieve some of the pressures on the hospital inpatient setting by preventing the need for an admission by 'bringing the hospital to the patient' by offering a care pathway similar to that of the acute setting and aims to reduce ED attendances, prevent hospital admissions, and support advanced (early) discharge (Lee and Titchner 2016).

The literature on hospital in the home has shown positive results in terms of patient satisfaction, lower mortality rates, lower readmission rates and avoiding hospital admission from studies in Australia, New Zealand, Italy and the UK (Facultad & Lee 2019; Lee et al., 2017; Lee and Titchener 2065; Varney et al., 2014; Montalto et al., 2010a; Shepperd et al., 2009; Wilson et al., 2003). In Victoria, Australia, 32,462 patients were admitted into the hospital at home service, representing 2.5% of all the inpatient admissions for the state and has significantly increased the overall capacity of the hospital system (Montalto 2010b). Also in Australia, Varney et al. (2014) performed an integrative review of 22 articles to assess the efficacy of admission avoidance specifically within the Hospital In the Home (HIH) services

concluded that recruiting (admitting) patients straight from the ED into HIH services is cost effective, equates to higher patient satisfaction, yet found no effect on clinical outcomes or rates of adverse reactions following on from admission to the service. Despite these studies, there is little evidence of cost-effectiveness. From the UK perspective, Imison et al. (2017) critically states that there is little robust evidence that hospital at home services deliver net savings and argue that further cost analysis is needed. The following section outlines the service offered by the @home team.

Description of @home service

The @home team is based in south east London, covering the London Boroughs of Lambeth and Southwark. The term 'locally' therefore refers to Lambeth and Southwark. In 2016, Lambeth had a registered population of almost a third of a million people, 318,000 (Lambeth Government website, 2017) and Southwark has a population of 288,283 (Southwark Government website, 2016). Owing to a growing population and service demand, an extra 200,000 primary care appointments were created by service expansion over the total 8 boroughs of south east London, but this seems has had little real impact locally in terms of meeting pressures for healthcare services (NHS 2016). From the perspective of this audit, the @home team only covers residents with a registered GP in Lambeth or Southwark, providing care in the patient's usual place of residency (i.e. their own home, nursing/residential care home or residential hostel). Occasionally, if a GP is registered as Lambeth or Southwark, but the patient lives on the borders or edge of the ward, care can then be delivered, but a registered Lambeth or Southwark GP is necessary, or the service cannot access funding. Currently, the @home team offer 25 clinical pathways, with more being developed. The staff working within the @home team consists of contracted General Practitioners, Matrons, Clinical Nurse Practitioners, Staff Nurses, Physiotherapists, Occupational Therapists, and clinical support staff. The @home team are supported by admin staff and a business manager. The Matron leads the team, and holds clinical accountability and geriatricians attend for six sessions per week to offer medical guidance. Two Social Workers are commissioned to work for a number of hours per week within the service. The consultants led by the Matrons perform virtual ward rounds and are also available to do home visits or Comprehensive Geriatric Reviews. The team is diverse and offers varied clinical expertise to ensure that the patient receives a holistic care plan and treatment package. With access to hospital diagnostics, the patient's journey should mirror that of the hospital, except that it is delivered within their own home rather than in an acute setting. The service's working hours are 8am

until 11pm, 7 days a week including bank holidays. SELDOC (South East London Doctor On Call), the local out of hours GP service, has the contract to provide care outside of 8am – 11pm. Patients' clinical notes are documented both within the place of residence (with a copy remaining until the episode of care has completed) and on a shared (confidential) IT system. Other community staff in Lambeth and Southwark, such as, District Nurses, Podiatrists, Dieticians etc have access to the IT system: Care-Notes, so therefore can read what care the @home team is delivering. This also reduces duplication of care.

Alongside early hospital discharge and admission avoidance, the @home team also offers an alternative to ED attendances. For example, a patient who has been seen by a GP, who may require intravenous antibiotics can be commenced and monitored in their home by the team, rather than follow the more traditional route of presenting at ED with a GP referral for an admission. Thus the @home service aims to reduce local ED and hospital attendances, as well as hospital bed days.

Given this, the aim of this paper was to establish if the @home team contributes to the reduction of ED attendances at the local emergency departments and has an impact on the 4-hour operational targets in EDs.

Methods

Study setting & participants

The @home team is based in south east London, covering the London Boroughs of Lambeth and Southwark. The term 'locally' therefore refers to Lambeth and Southwark. In 2016, Lambeth had a registered population of almost a third of a million people, 318,000. This is 4% of the 8 million people living in London (Lambeth Government website, 2017). Southwark has a slightly smaller population of 288,283 (Southwark Government website, 2016). As with most London boroughs, there is a diverse range of socio-economic statuses. Owing to a growing population and service demand, an extra 200,000 primary care appointments were created by service expansion over the total 8 boroughs of south east London, but this seems has had little real impact locally in terms of meeting pressures for healthcare services (NHS 2016). The @home team was commissioned in response to the benefit of transferring hospital care into the home and relieve the pressure on the local EDs. The service is provided by Guy's and St Thomas's NHS Trust (GSTT) and commissioned by the Lambeth and Southwark Clinical Commissioning Groups (CCGs). Although it is a GSTT run service, following on from a recent

Trust-wide care, collaboration and information sharing IT programme, the team have access to King's College Hospital (KCH) clinical records and ordering portals (Blood tests, X-rays etc). Geriatricians from both Trusts provide clinical input, advice and patient contact time. The majority of referrals accepted are for patients whose local hospital is either St Thomas's Hospital (Guys and St Thomas's Trust) or King's College Hospital (King's College Hospital Trust).

Ethics

As the Trust deem this an evaluation of a service, ethics approval was not required. Although the Trust is mentioned, as this is necessary for the audit purpose, the confidentiality of both patients and staff members has been respected in accordance with the Nursing and Midwifery Council (2015).

Study Design

This audit reviewed the referral data of the @home team and the two local NHS Trust ED attendances over a 3-month period, from September 2016 to November 2016, inclusive. These data were evaluated in order to capture the number of ED attendances reduced/prevented by the @home team. An audit tool was devised in order to address the research question and using this, each @home referral was checked to see if that patient fitted the criteria of a patient who would have attended ED if not seen by the @home team. The @home team takes referrals from both the acute settings (both hospitals to initiate early discharge), from community services (to avoid hospital admission) and London Ambulance Service (to avoid ED attendance for example). These audited referrals were then inputted into Geographical Information System (GIS) software, MapInfo, and geocoded using postcodes, in order to assess their relative proximity to the EDs at King's College Hospital and St Thomas's Hospitals. This resulted in a numerical figure of the reductions in attendances per ED and related NHS Trust.

Data collection

Data were collected from Department of Health published and public records regarding the ED performance of both St Thomas's ED and King's College Hospital ED. These data are within the public domain. In order to establish the audit question, the @home referrals within a 3-month period were reviewed. Each referral was then measured against an ED prevention audit tool, allowing a second set of numerical data to be sought. The total accepted referrals were then mapped against their postcodes. This mapping exercise was to establish which ED the @home service impacted on most, either St Thomas' Hospital or King's College Hospital. This gave

further numerical figures of the assumed reductions in attendances per trust. This was then divided by the overall ED attendance figures with a calculation being made as to whether or not a significant reduction in attendances was made on overall ED performance.

Collection Stages

Phase 1 of the process was to collect and review all the referrals made to the @home team from September 2016 to November 2016. These data then needed to be filtered with any identifiable data and irrelevant data being eliminated (Morrell and Harvey 2005). This was done through accessing the shared local care record, Care-notes. Care-notes is used by all community staff in Lambeth and Southwark. To use this programme staff must have both been trained and have an individual password. Importantly when staff access Care-notes, they leave a traceable digital footprint. This is useful for audit purposes and to ensure quality control of clinical records.

Care-notes holds all the data for each patient referred to the @home team. Each patient's referral for each @home episode was first obtained. Identifiably data such as names, NHS numbers and GP details were deleted as not relevant to capture the data needed for this audit and to maintain patient confidentiality. Once the appropriate data had been retrieved, it was then inputted into Microsoft Excel. Once in Excel the data was kept on a password only access laptop, again with confidentiality being maintained.

Phase 2, was to create the ED prevention tool (**Supplementary table 1**). This tool was used to filter all the referrals, to ensure that the most appropriate and relevant information was collected. No comparable tools are available and therefore clinical judgement was used to devise the tool.

Insert Table 1 here

The 3rd phase was to collect NHS England published performance figures for the same timeframe (September 2016-November 2016). EDs have a statutory duty to report these attendance figures, their adherence to the 4-hour operational target, and the percentage this deems their performance at, this is a requirement by NHS England. Such data are published within the public domain. Once all the relevant data were captured, this information was then inputted into Excel and further analysed.

The final part of the data collection was to map the postcodes of each address of each referral made against the postcodes of the two hospitals. This resulted in a numerical breakdown, dependent on proximity to each hospital, of the number of attendances prevented for each

trust. In order to attempt to determine which ED the patients would have attended; a mapping exercise was performed using MapInfo Geographical Information System (GIS) software. According to Musa et al (2013), such systems are being applied more frequently in healthcare research. The audited referrals were geo-coded by matching their postcodes against those found in the Office of National Statistics Postcode Directory (ONSPD). The ONSPD file contains longitudes and latitudes for geo-coding, this is defined in basic terms as the creation of points on a map (Phillips et al 2000). The same process was then used to geo-code the postcodes of St Thomas's Hospital, King's College Hospital, and the @home team office.

MapInfo includes an add-on function called 'Distance Calculator'. This allowed for a 'nearest neighbour' analysis to be conducted, allocating each of the patients' homes to the nearest ED.

Results

The total number of accepted referrals to the @home team, September 2016- November 2016 was 71.8% with just under 400 referrals per month with 397 patients identified as being prevented from attending ED (**Table 2**). The 397 patients equate to around 0.3% of the total at the EDs. Thus the @home team prevented around 1 in 300 (the sum shows 1 in 302) patients from presenting at King's College Hospital or St Thomas's ED.

Insert Table 2 here

In the same period, a total 119,718 patients presented at the EDs (**Table 3**). King's College Hospital recorded 71,688 attendances over the three-month period while St Thomas's ED recorded 48,030 attendances. This equates to approximately 787 patients attending ED in a 24-hour period at King's College Hospital and 527 attending St Thomas's ED over the audit period. In relation to the four-hour operational target of seeing 95% of all ED patients, both King's College Hospital and St Thomas's EDs did not achieve this in the audit period covered (September 2016- November 2016) with 81% of King's College Hospital patients being seen within 4 hours and 86.7% of St Thomas's ED patients.

Insert Table 3 here

A mapping exercise was performed, using nearest neighbour analysis, to assess which ED the patients seen by the @home team would most likely have attended. The maps offer a visual picture of the location of the @home referrals office in relation to the local hospitals. The points for St Thomas's Hospital, King's College Hospital and the @home team locations, are shown in **Figure 1 below**. The same figure also marks the patients' own home locations. Local authority boundaries were downloaded from data.gov.uk to help better display the distribution of these locations across Lambeth and Southwark.

Insert Figure 1 here

Most of the patients' homes are closer by straight line distance to King's College Hospital ED than to St. Thomas's ED. This is as expected given the relative locations of the hospitals within the London boroughs of Lambeth and Southwark. St. Thomas's Hospital is located on the River Thames which is at the northern boundary of Lambeth, whilst King's College Hospital sits about 3.3km further south within Lambeth, close to the Southwark boundary, and geographically at the centre of the area covered by the two boroughs combined (**see Figure 2**). This has an impact on referral rates to the @home team. Of the 387 patient records audited, according to the mapping analysis, 298 of their homes were nearer to King's College Hospital ED; 89 homes were nearer to St. Thomas's ED. Therefore, suggesting that from September 2016 – November 2016, 298 patients were prevented from attending King's College Hospital ED, with 89 patients being prevented from attending St Thomas's ED.

Insert Figure 2 here

DISCUSSION

The analysis of the referrals after being checked against the ED prevention tool, showed that out of a total of 1084 patients referred to the @home team, 397 patients were prevented from going to ED. This cohort of patients would have otherwise presumably attended at the ED at either St Thomas's or King's College Hospitals. Following the mapping exercise using the 'Distance Calculator on MapInfo software (a 'nearest neighbour' analysis), a conclusion is that 298 (77%) of the accepted @home referrals would have instead presented to King's College Hospital ED and 89 (23%) to St Thomas'. This excludes the 10 out of 397 patients that could not be mapped (only 2.5% of the cohort). The @home team is a Guy's and St Thomas' Trust (GSTT) run service, yet the above mapping data suggests that in terms of reducing ED

attendances locally (by 397 patients in 3 months), Kings College Hospital benefitted with a reduction in attendances. According to the mapping exercise, 77% of all the referrals prevented from attending ED by the @home team would have likely presented at King's College Hospital ED. In terms of financial benefits, GSTT will charge each patient's Community Commissioning Group (CCG) for the (accepted) referral, so where KCH would have charged per ED attendance, GSTT will now make that charge instead. It could be argued that KCH mostly benefit from reduced attendances, and reduced ED pressures, whilst GSTT benefit to a lesser degree from reduced ED attendances, but also from increased financial gain.

From a service delivery perspective, the @home team is demonstrably reducing ED attendances, albeit a small proportion. This clearly has some benefit for under pressure EDs, but as discussed in the literature review, wider benefits in terms of healthcare outcomes, patient satisfaction, and the financial costs need further exploration if the net benefits of the @home team are to be robustly demonstrated (Facultad & Lee 2019; Lee et al., 2017; Lee and Titchener 2065; Varney et al., 2014; Montalto et al., 2010a; Shepperd et al., 2009; Wilson et al., 2003). However, positive results are showing in Victoria State, Australia, where much larger, longer-standing hospital at home services are in operation and in the UK, a raft of new initiatives are being trialled (Lee et al., 2017; Lee and Titchener 2016, Maysum et al 2015).

The hospital in the home service is a relatively recent development in the delivery of healthcare. Similar to emergency care and its establishment and development as a specialty over the past 40 years, hospital in the home is evolving as the ageing population increases and the need for acute episodes of care for chronic conditions is noted (Ham 2015; Imison *et al*. 2017). Hospital in the home is one solution to addressing the crisis in healthcare and the demands on EDs (Hunt, 2016; Lee & Titchner, 2017). Other solutions include primary care facilities placed near EDs and sessional work by General Practitioners in EDs (Imison *et al*.2017).

In terms of the mapping exercise, arguably it is journey time, not straight-line distance which is likely a stronger determinant of which ED patients would have visited had they not been seen by the @home team. A completely accurate percentage cannot be statistically offered without further, in-depth analysis. This is because with the data obtained, it is currently unclear as to what mode of transport the patients would have used e.g. cars, ambulance, walking, or even public transport. Each mode of transport will have a different journey time, also different routes may be preferred at differing times of the day. This contributes to more

accurate journey times being very difficult to model without further substantial qualitative and quantitative data collection.

This issue of whether to use straight-line distances or journey times is less pronounced in an urban area such as Lambeth and Southwark. Denser road networks offer a wider choice of routes, meaning that journeys to hospitals will be closer to straight-line than in areas with fewer roads per square kilometre. 79% of Lambeth is built-up, as is 72% of Southwark, vs 6% of the UK. Geocoding and GIS systems are being used more regularly in healthcare analysis (Phillips et al 2000). Certainly, for this analysis, this method has enabled the @home numerical data to be broken down further by the ED that the patient would likely visit.

In terms of which ED patients would have attended, varied human preferences, some less predictable, must be considered. Patients may not want to attend the ED geographically closest to them, with the introduction of 'book and chose' initiatives, patients may have a personal preference. Other factors to consider are shortest or cheapest journey times, and that patients may have had surgery at a particular hospital or be under a specific team. Both the hospitals offer speciality services so for example cardiothoracic services are delivered by GSTT, whereas Acute Stroke services are delivered at King's College Hospital. Therefore, clinical need may also outweigh locality or distance, but it was not possible to examine this.

As previously acknowledged, there is currently a paucity of research within hospital in the home and as this new specialty develops, there is a need to demonstrate its feasibility, applicability, cost-effectiveness and report patient satisfaction. A book chapter by Ellenbecker *et al.* (2008) highlighted the need for further research into safety and quality of care delivered within the home setting. The authors identify six areas where further research is required when delivering hospital in the home programmes: Medication management, fall prevention, unplanned hospital admissions, nurse work environment, functional outcomes and quality of life and wound and pressure ulcer management. A relatively recent Cochrane review noted that there was still very limited data on hospital in the home and that although it may be a suitable alternative to hospital, the evidence is currently lacking (Iliffe et al 2016).

Limitations

Data were only 3 months' worth of data and although sufficient in terms of numerical critical mass (1084 patients), slightly different proportions of @home patients who would otherwise

have attended ED may emerge in other seasons of the year. Further, although it was designed to be as accurate as possible and based on the author's (NP) experience as an @home matron determining patient flows, owing to the nature of patient disease and condition, the ED Prevention Tool will not be completely accurate regarding which patients with which conditions would have attended ED. The ED Prevention Tool is also un-validated, however there are currently no other comparable tools to use (Lee et al., 2017; Titchener and Lee 2016). Further research could be used to validate the ED Prevention Tool for use in future studies.

Another explanation for the relatively low impact on local ED attendances is that there may be a lack of knowledge about the @home service. Therefore, more work needs to be done locally to promote the service and ensure that GPs and other local primary care services are aware that the @home team is a comparable pathway to sending patients to ED. There seems to be some evidence that adoption of hospital at home services has been delayed by the lack of clarity into what is expected from a service like the @home team. Nationally, services like the @home team need to be defined and clarity into the service provision needs to be disseminated to both the public and health care professionals. Only then will any beneficial shifts between using acute hospital settings and delivering comparable care within the community be seen. Certainly, this would have an impact on the number of attendances to EDs, and once established hopefully will contribute towards EDs achieving the 4-hour operational target. In summary, from the data collected, the numerical referral data and from the mapping exercise, it is reasonable to suggest that the assumption can be safely made that the @home team does reduce and prevent a number of ED attendances locally.

Relating to the 4-hour operational target, the data clearly shows the significant number of patients attending both these EDS with nearly 72,000 attending King's College Hospital and 48,000 attending St Thomas's ED, and this equates to a mean 787 and 527 patients being seen in each ED over a 24-hour period. When these EDs were designed, the maximum numbers expected to be treated in 24 hours was 400 and so this clearly demonstrates the strain on the services. The other issue is that patients attend ED because they are unable to get a GP appointment, and this is despite an extra 200,000 appointments being made available in Southwark and Lambeth primary care. Within the context of these figures, it is not surprising that the @home service does not have a significant impact on the 4-hour operational target when all parts of the health service are overburdened.

Conclusion

From this small clinical audit, it is clear that the @home team only reduces a small number of ED attendances each month (roughly 1 in 300 patients). The strains on the local health services require significant investment in in terms of resources and personnel to meet the ever-increasing demands. From the perspective of the @home service, it would be beneficial to undertake more longer-term extensive analyses.

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